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PTR-MS and GC-MS measurements of herbivore induced VOC emissions

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In response to abiotic and biotic stress plants emit increased amounts of VOC compared to non-stressed plants. The formation and release of herbivore induced VOC gained interest because terpenoids were found to have a signaling function in plantinsect-predator interaction (tritrophic systems). To get insight into the succession of induction and release of such signaling VOC the time of emission of LOX-products and terpenoids is important.

We studied the emission and succession of VOC emitted from poplar leaves in response to herbivory under ambient temperature and light conditions in a branch enclosure supplied with ozone free, scrubbed air.

With PTR-MS we monitored continuously the succession of compounds released from infested leaves compared to non-infested. The composition of LOX-products, monoand sesquiterpenes was analyzed by GC-MS at the beginning and end of each experiment.

The on-line measurements show that C6-aldehydes are emitted by the infested plant from time to time indicating feeding activities of the herbivores. In agreement with GC-MS data we observed increased emissions of mono- and sesquiterpenes from infested leaves after 20 hours of insect damage. GC-MS analysis identified the monoterpene β -ocimene and the sesquiterpene α -farnesene to be the most prominent terpenoids emitted from the infested plant after 20 hours. Our results show that the emission of both terpenoids is induced by herbivore feeding activity.